Metrologic®
We really work for you.™

IS4813, IS4815, IS4823, and IS4825

Single-Line Laser Scan Engine

Integration Guide

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Trademarks

Patents

Refer to page 38 for a list of patents.

Table of Contents

Introduction

Product Overview

The non-decode IS4813 and IS4815 laser scan engines are designed for direct integration into custom OEM devices equipped with a decoder. The engine's small size is ideal for integration into mobile computers, hand-held scanners, medical/diagnostic equipment, mobile printers, lottery terminals, ATMs and access control devices.

For customer applications requiring decode functionality in addition to solid scan engine performance, the IS4823 and IS4825 models combine the miniature IS4813 and IS4815 engines with a decoder and an optional mounting bracket for a complete small package that provides integration flexibility to meet a variety of OEM applications.

The IS4823 and IS4825 deliver aggressive scanning with a decoded output on all standard 1D bar code symbologies — including UPC, EAN, Code 39 and I 2 of 5 — as dense as 4 mil. The IS4823 and IS4825 models support TTL level RS232 or USB system interfaces. They can operate in standard trigger mode, as well as "blinky" mode for hands-free scanning.

The laser scan engine series is equipped with a multitude of features including:

- 100 Scans per second
- Support for 3.3VDC input voltage (IS4813, IS4823)
- Support for 5VDC input voltage (IS4815, IS4825)
- A 650 nm bright laser diode
- A narrow exit angle to provide precise beam positioning
- Automatic (hardware) scan sense
- A rugged die cast engine chassis with threaded mounting holes
- An optional mounting bracket for integration flexibility (IS4823, IS4825)
- A 10-pin (IS4813, IS4815) or 12-pin (IS4823, IS4825) ZIF connector with industry standard pinout for seamless integration into portable devices
- Low mass property (see page 21) in an industry standard size
- A wide sweep angle for scanning big bar codes up close

For ease of integration and optimum engine performance, Metrologic has designed a Software Development Kit (SDK) for the IS4813 and the IS4815. Contact a customer service representative or sales representative for additional information (see page 41).

Notes: The manufacturer of the end equipment must register with agencies such as the Food and Drug Administration (FDA). The specifications required for registration are not obtainable until the OEM manufacturer uses the IS4800 series scan engine in its final configuration. *Therefore, it becomes the responsibility of the manufacturer who incorporates the scan engine into their product to comply with all federal laser safety regulations.* The manufacturer must submit a Laser Product Report for the FDA in the US.

THIS DEVICE DOES NOT COMPLY WITH 21 CFR 1040. USE ONLY AS COMPONENT.

Models and Accessories

Non-Decode Engines

Options	
Model	Description
IS4813	Non-Decode, 3.3VDC Scan Engine
IS4815	Non-Decode, 5VDC Scan Engine

Accessories	
Part Number	Description
19-07335	Flex Cable, 10-POS, 67.5 mm Length

Decode Engines

Options	
Base Model	Description
IS4823	3.3VDC Scan Engine with Decode PCB
IS4825	5VDC Scan Engine with Decode PCB

Model and Kit Delineation

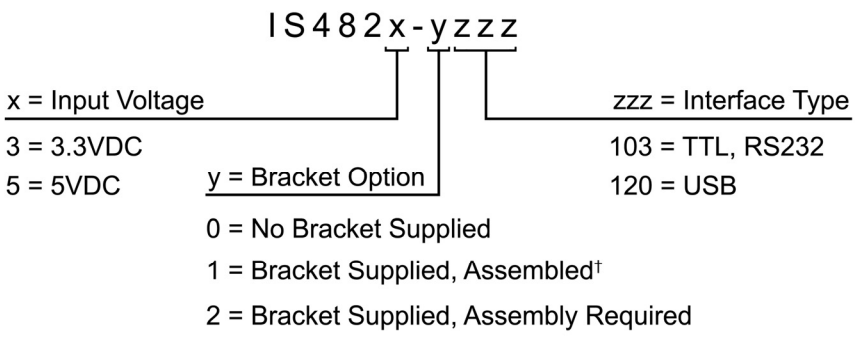


Figure 1. IS4823/IS4825 Model and Kit Delineation

Accessories	
Part Number	Description
19-00329	Flex Cable, 12-POS, 80 mm Length
19-07335	Flex Cable, 10-POS, 67.5 mm Length

Labels

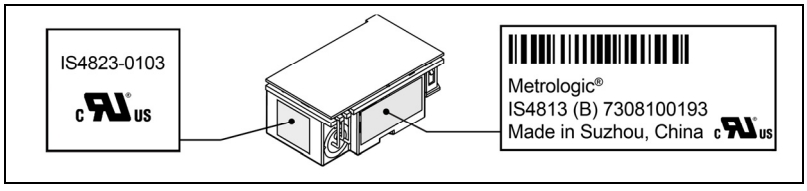
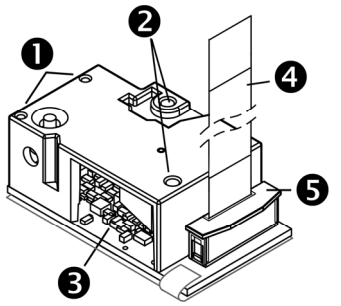
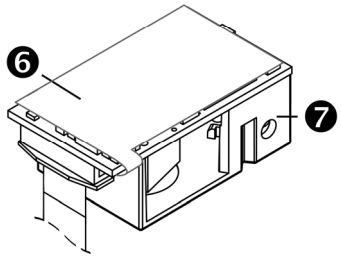


Figure 2. Serial Number Label (Enlarged For Illustration Purposes)

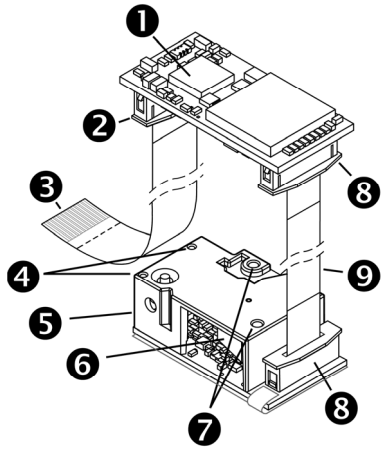
† *Option is not available for sale in all regions. Contact a customer service representative for additional information.*

Components of the IS4800 Engine Series

IS4813 and IS4815 Non-Decode Engine

Item	Description	Item Location
1	Pin Locator Holes *(see page 6)*	  *Figure 3. IS4813/IS4815*
2	Threaded Mounting Points *(see page 6)*	
3	Exit Beam Location, Laser Light Aperture AVOID EXPOSURE! – LASER LIGHT IS EMITTED FROM THIS APERTURE.	
4	Flex Cable, 10-POS	
5	ZIF Connector, 10-Pin	
6	Printed Circuit Board and Shield	
7	Die Cast Chassis	

IS4823 and IS4825 (-0) Decode Engine Assembly

Item	Description	Item Location
1	Decode Printed Circuit Board	 *Figure 4. IS4823-0/IS4825-0*
2	ZIF Connector, 12-PIN	
3	Flex Cable, 12-POS	
4	Pin Locator Holes *(see page 6)*	
5	IS4813 or IS4815 Laser Scan Engine	
6	Exit Beam Location, Laser Light Aperture ⚠ AVOID EXPOSURE! – LASER LIGHT IS EMITTED FROM THIS APERTURE.	
7	Threaded Mounting Points *(see page 6)*	
8	Flex Cable, 10-POS	

IS4823 and IS4825 Bracketed (-1† and -2) Decode Engine Assembly

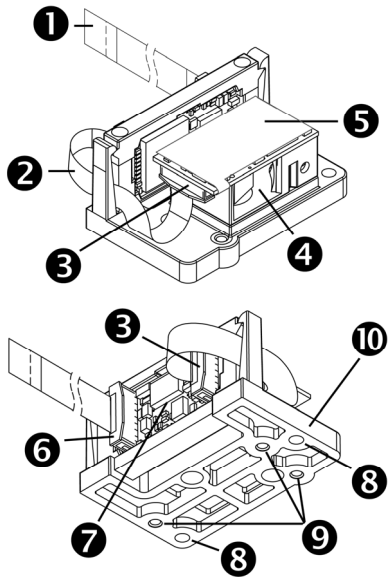
Item	Description	Item Location
1	Flex Cable, 12-POS	
2	Flex Cable, 10-POS	
3	ZIF Connector, 10-PIN	
4	Exit Beam Location, Laser Light Aperture ⚠ AVOID EXPOSURE! – LASER LIGHT IS EMITTED FROM THIS APERTURE	
5	IS4813 or IS4815 Laser Scan Engine	
6	ZIF Connector, 12-PIN	
7	Decode Printed Circuit Board	
8	0.10 Dia. Clearance Holes for Mounting, 2 Pls.	
9	M2 x 0.4 Threaded Bosses for Mounting, 3 Pls.	
10	Bracket	
11	Screw, M1.2 – 6.36 mm T3, Thread Forming	
12	Screw, M1.6 x 35 – 5 mm Philips, Stainless Steel with Patch, 2 Pls.	

Figure 5. IS4823-1/IS4825-1 Assembled†

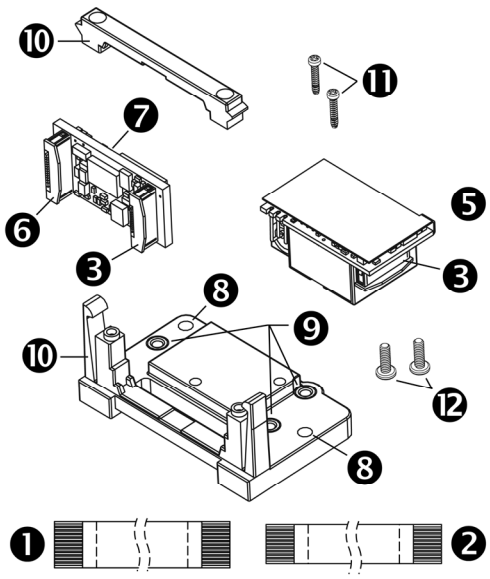


Figure 6. IS4823-2/IS4825-2 Unassembled

† *Option is not available for sale in all regions. Contact a customer service representative for additional information.*

Assembly

IS4823-2 and IS4825-2

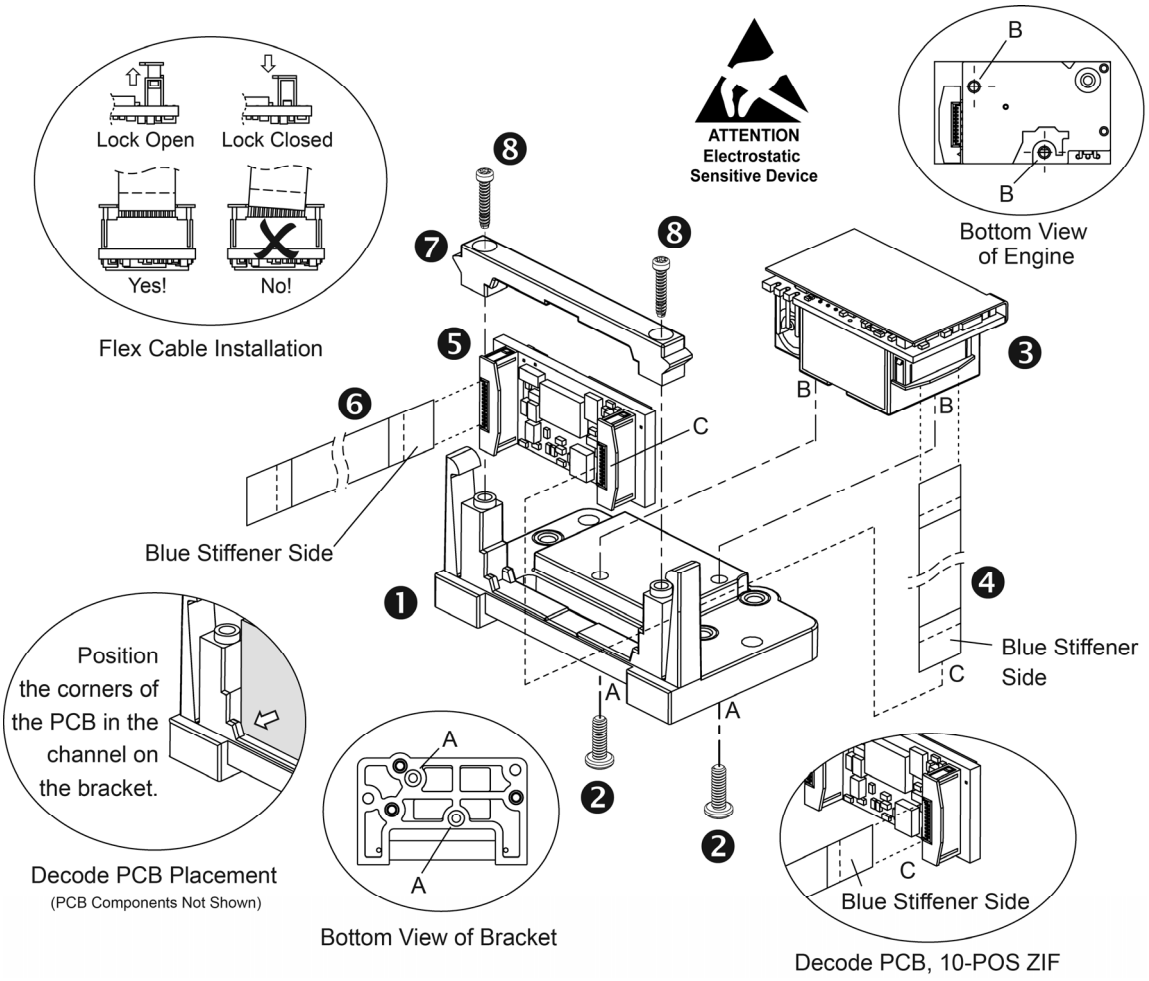


Figure 7. IS4823-2/IS4825-2 Assembly

Item	Description	Qty.
1	Bracket, Base	1
2	Screw, M1.6 x 35 – 5 mm, Philips Stainless Steel with Patch	2
3	IS4813 or IS4815 Scan Engine	1
4	Flex Cable, 10-POS	1
5	Decode Printed Circuit Board	1
6	Flex Cable, 12-POS	1
7	Bracket, PCB Locking Bar	1
8	Screw, M1.2 – 6 mm, T3, Thread Forming	2

Tools Required	Size
Torx® Screw Driver	T3
Phillips Screw Driver	00

Mounting Specifications

IS4813 and IS4815 Scan Engine Dimensions

The engine has two M1.6 tapped holes on the bottom of the chassis for mounting the engine with screws. Two additional blind holes are provided on the bottom of the engine for keying purposes to assist with engine alignment (see figure below).

Warning: The limited warranty (on page 37) is void if the following recommendations are not adhered to when mounting the IS4800 series laser scan engine.

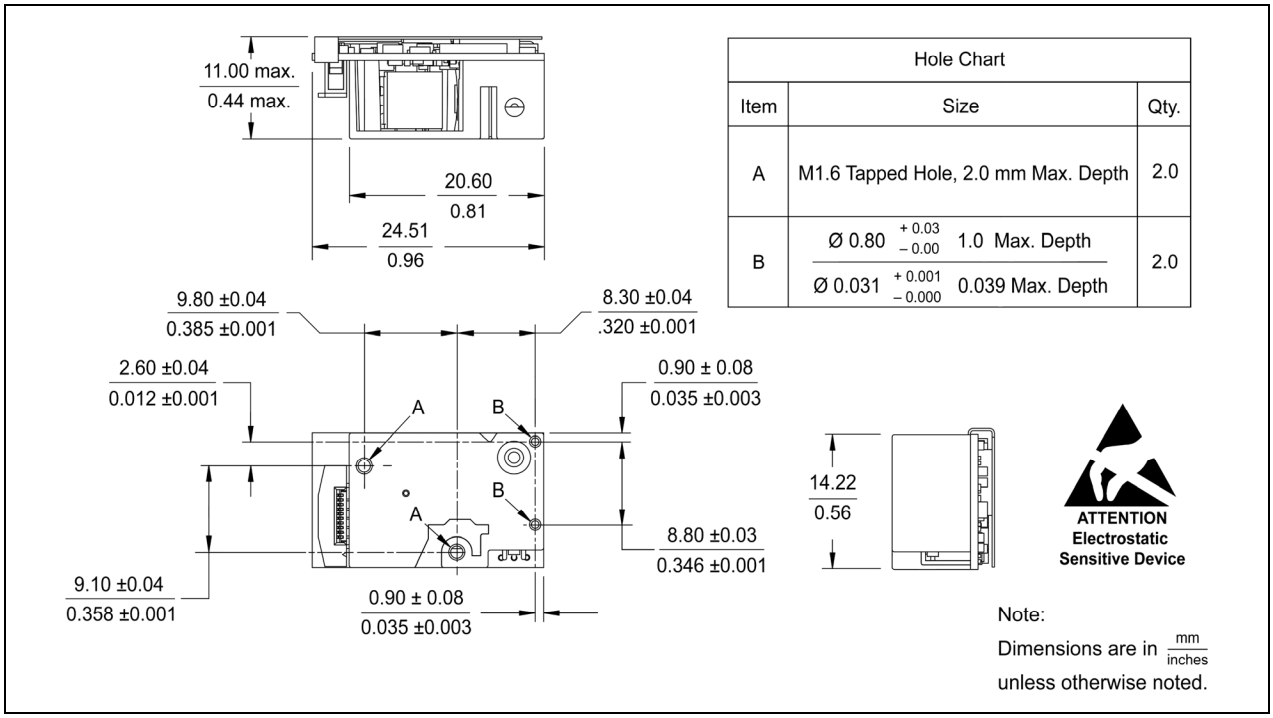
Follow the guidelines listed below when securing the engine to non-metallic or metallic mounting surfaces.

For a non-metallic mounting surface:

- Use *non-magnetic* M1.6 x .35 stainless steel screws.
- Do not exceed 1.35 ± .09 cm-kg [1.17 ± .08 in-lbs.] of torque during screw installation.
- Use a minimum mount thickness of 3 mm.
- Use safe ESD practices when handling and mounting the engine.

For a metallic mounting surface:

- The die-cast engine chassis is at +Vcc. Use an insulator between the engine chassis and the host (.005" thick PR4, or equivalent).
- Use *non-metallic* nylon or equivalent M1.6 x .35 screws.
- Do not exceeding 1.35 ± .09 cm-kg [1.17 ± .08 in-lbs.] of torque.
- Use a minimum mount thickness of 3 mm.
- Use safe ESD practices when handling and mounting the engine.



Hole Chart

Item	Size	Qty.
A	M1.6 Tapped Hole, 2.0 mm Max. Depth	2.0
B	Ø 0.80 +0.03 −0.00 1.0 Max. Depth / Ø 0.031 +0.001 −0.000 0.039 Max. Depth	2.0

Figure 8. IS4813 and IS4815 Engine Dimensions

Specifications are for reference only and are subject to change without notice.

IS4823 and IS4825 Bracketed (-1 and -2) Dimensions

The engine bracket has three M2 x 0.4 threaded inserts on the bottom for mounting the assembly with screws. Two through holes are also provided as an alternative mounting method.

Warning: The limited warranty (on page 37) is void if the following recommendations are not adhered to when mounting the IS4800 series laser scan engine.

When securing the engine by utilizing the three M2 threaded inserts:

- Use M2 x 0.4 Phillips Pan Head, Type AB, Steel, Zinc Clear or equivalent screws.
- Do not exceed 2.88 cm-kg [2.5 in-lb] of torque when securing the engine assembly to the host.
- Use a minimum mount thickness of 3 mm.
- Use safe ESD practices when handling and mounting the engine assembly.

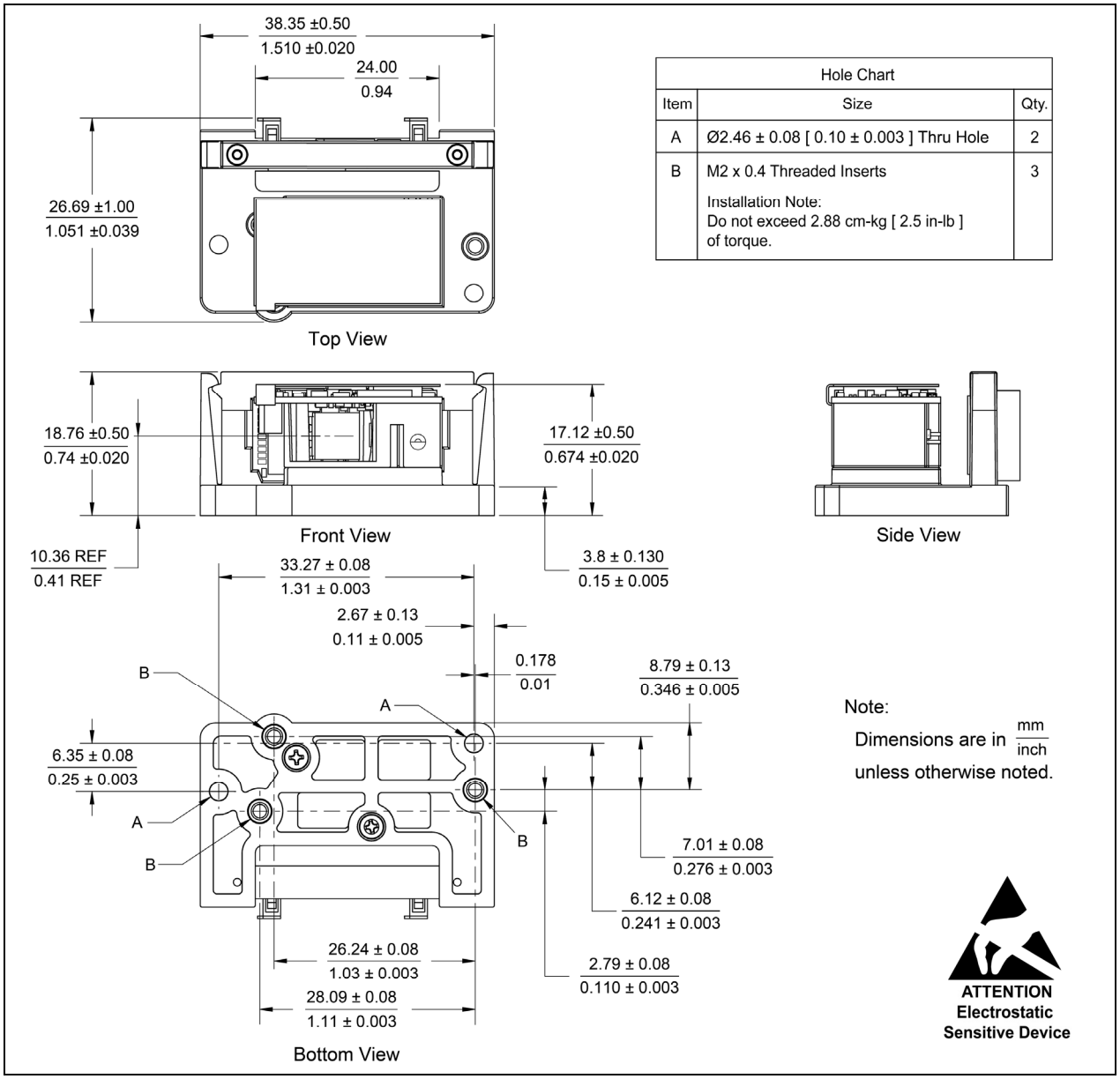


Figure 9. IS4823/IS4825 Bracketed (-1 and -2) Dimensions

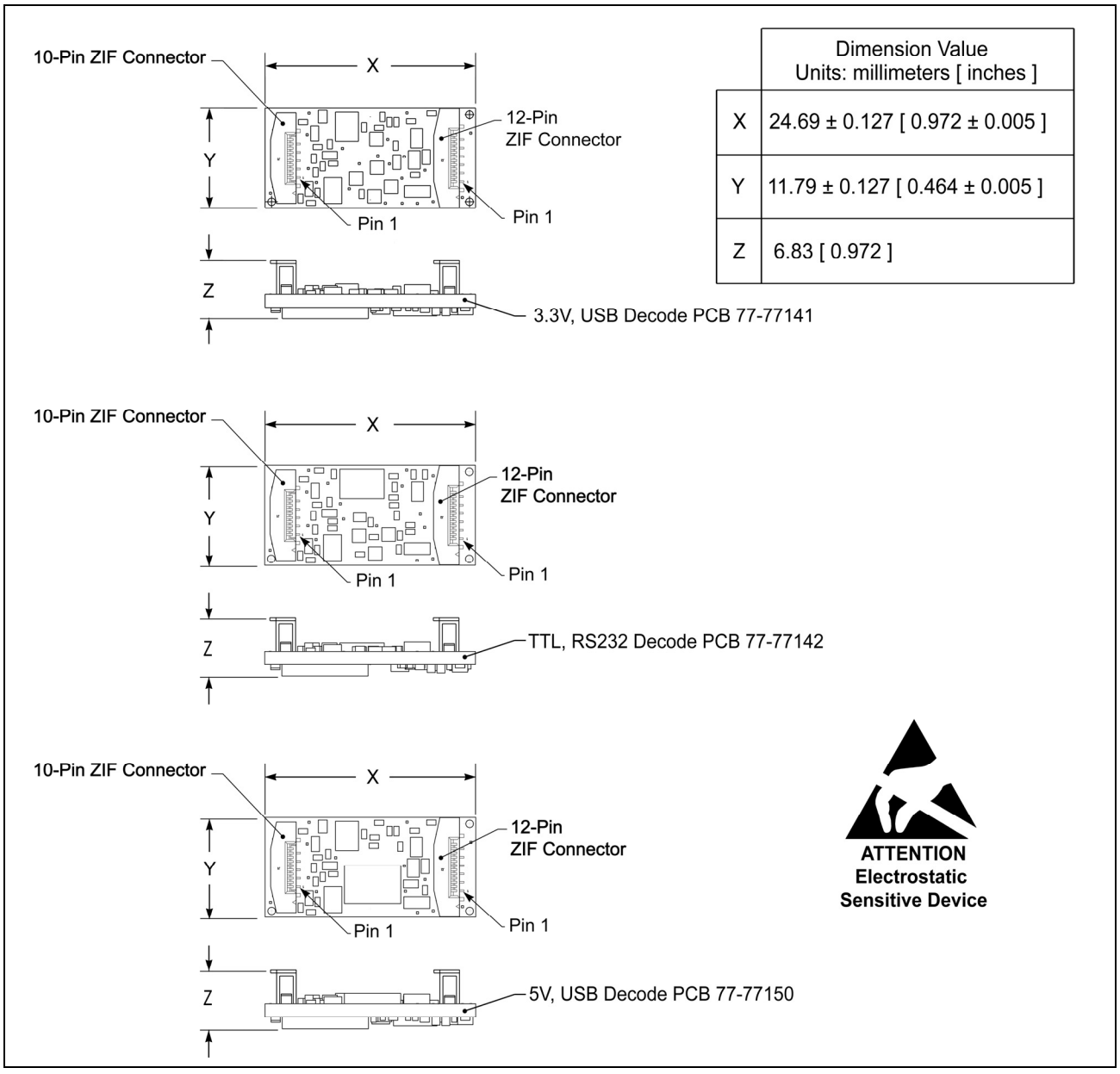
Specifications are for reference only and are subject to change without notice.

IS4823 and IS4825 (-0) Decode Printed Circuit Board Dimensions

Warning: The limited warranty (on page 37) is void if the following recommendations are not adhered to when mounting the IS4800 series laser scan engine.

When securing the decode board:

- 3M™ 4032 1/32" double-coated urethane foam tape (or equivalent).
- Use safe ESD practices when handling and mounting the decode board.



	Dimension Value Units: millimeters [inches]
X	24.69 ± 0.127 [0.972 ± 0.005]
Y	11.79 ± 0.127 [0.464 ± 0.005]
Z	6.83 [0.972]

Figure 10. IS4823/IS4825 Decode PCB Dimensions

Specifications are for reference only and are subject to change without notice.

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Exit Beam Specifications

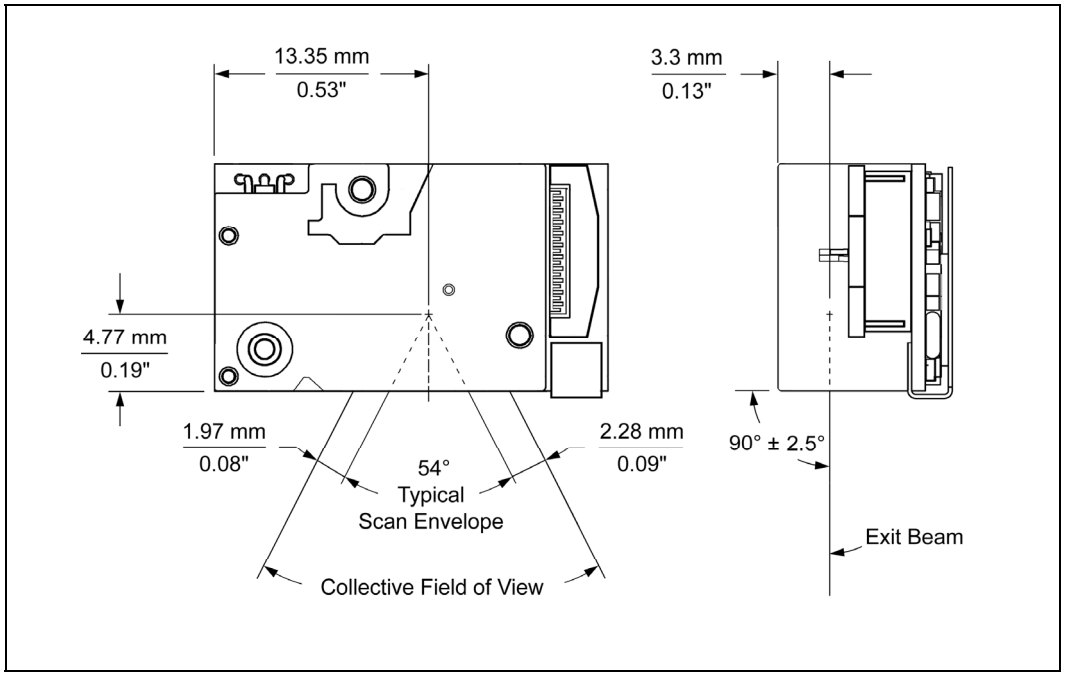


Figure 11. IS4800 Series Exit Beam Specifications

See page see pages 12 - 15 for information on window material specifications and enclosure design considerations.

Specifications are subject to change without notice.

Enclosure Specifications

The IS4800 laser scan engine series was specifically designed for integration into custom housings for OEM applications. The scan engine's performance will be adversely affected or permanently damaged when mounted in an unsuitable enclosure.

Note: THIS DEVICE DOES NOT COMPLY WITH 21 CFR 1040. USE ONLY AS COMPONENT.

The limited warranty (on page 37) is void if the following considerations are not adhered to when integrating an IS4800 series scan engine into a system.

Electrostatic Discharge (ESD) Cautions

ATTENTION
Electrostatic Sensitive Device

ESD has the ability to modify the electrical characteristics of a semiconductor device, possibly degrading or even destroying the device. ESD also has the potential to upset the normal operation of an electronic system, causing equipment malfunction or failure.

The scan engine has exposed electrical components.

- DO NOT touch the leads of the visible laser diode (VLD) or other components.
- ALWAYS use grounding wrist straps and a grounded work area when handling the engine.
- Mount the engine in a housing that is designed for ESD protection and stray electric fields.

Grounding

If the scan engine is going to be installed in a grounded host:

- The die-cast engine chassis is at +Vcc. Use an insulator between the engine chassis and host.
- Use non-metallic nylon or equivalent screws.

Power Supply

The IS4813/IS4815 *non-decode* engines are powered from the host device through the 3.3V or 5V and GND pins of the engine's 10-Pin ZIF connector. IS4823/IS4825 *decode* engine assemblies are powered from the host device through the 3.3V or 5V and GND pins of the 12-Pin ZIF connector on the decode board.

This voltage must be maintained within the specified voltage range (see electrical specifications on page 22) at the engine's PCB. Voltage drops in the host flex cable must be taken into account (see *Flex Cables* on page 11).

Power Sequencing◈

The IS4813/IS4815 *non-decode* engines are powered from the 3.3V or 5V power signal on the 10-Pin ZIF connector and the IS4823/IS4825 *decode* engine assemblies are powered from the 3.3V or 5V power signal on the decode board. Most of the host signals (signals present on the ZIF connector) are relative to this voltage. Not all of these signals are overvoltage tolerant. Care must be taken to ensure that the relationship between 3.3V or 5V and the host signals are always met (see electrical specifications on page 22).

◈ *See page 23 - 24 for additional electrical specifications.*
See page 26 - 28 for additional pinout information.

Flex Cables◈

Note: To ensure optimum engine stability, use the flex cables shipped with the scan engine.

The host flex cable is used to carry power and data signals between the engine and the host system. The flex cable should allow for a minimal voltage drop and maintain a good ground connection between the host and the engine. In terms of grounding and voltage drop, a shorter cable is better. The 10-POS flex cable used to connect the engine to the host or the engine to the decode PCB must be equal to or less than 67.5 mm in length. The 12-POS flex cable used to connect the decode PCB to the host must be equal to or less than 80 mm in length.

In addition to power, the flex cable also carries the digital signals required for communication. The cable design is especially important in USB interface applications due to the relative high speed of the USB signals. The impedance of the cable should match, or be as close as possible to the impedance of the USB driver (approximately 45 ohms per trace).

The routing of the flex cables plays a critical role in the system design. The host flex cable should be routed away from high frequency devices that have frequencies that can couple onto the flex cable and cause potential data corruption or unwanted electromagnetic inference (EMI).

Thermal Considerations

The IS4800 laser scan engine series is qualified over the specified operational temperatures (0°C to 40°C) for all operating modes. Make sure ambient temperatures do not exceed this range in order to guarantee operation. Operating the IS4800 in continuous mode for an extended period may produce considerable heating. This mode should be limited and sufficient airflow should be provided whenever possible to minimize internal heating. Excessive heating may potentially damage the IS4800 engine.

Printed Circuit Board (PCB) Component Clearance

Warning: When designing the IS4800 into the final product, eliminate all possible dangers of shorting sensitive electronic components in the IS4800 engine. A short could enable the scan engine to emit Class 3R radiation. Any CDRH filing will require a disclosure of the design ensuring a method to mitigate a potential short.

Magnetic Sensitivity

The scan engine can be negatively affected by magnetic fields:

- Use only non-magnetic screws and locating pins.
- Do not mount the engine within 1.00" (25.4 mm) of any magnetic materials.

Airborne Contaminants and Foreign Materials

The scan engine has very sensitive miniature electrical and optical components that must be protected from airborne contaminants and foreign materials. In order to prevent permanently damaging the scan engine and voiding the limited warranty (on page 37), the scan engine enclosure must be:

- Sealed to prevent infiltration by airborne contaminants and foreign materials such as dust, dirt, smoke, and smog.
- Sealed to protect against water, humidity and be non-condensing.

◈ *See page 23 - 24 for additional electrical specifications.*
See page 26 - 28 for additional pinout information.

Beam Clearance

- Keep the scan engine's beam sweep free from obstructions. For detailed information on the exit beam angle and location, please refer to *Exit Beam Specifications* on page 9.
- A dark matte-finish on the internal walls of the housing can be utilized to avoid internal beam reflections.

Output Window Properties

Note: Contact a customer service representative to coordinate the best window material required to maintain laser safety requirements for your application.

An improperly placed window has the serious potential to reduce the scan engine's performance. Careful consideration must be made when designing the output window's distance and angle placement relative to the scan engine's exit beam and chassis.

Follow these guidelines when designing the output window.

- Acceptable window materials include; Acrylic (cast or molded), float glass, CR-39, and Polycarbonate.

  Note: Molded polycarbonate is high in strength; however, it might exhibit a phenomenon called birefringence. Birefringence refers to multiple indices of refraction within one material. This condition will induce polarization effects that can be detrimental to scan performance of the engine. Check with a representative before utilizing a transparent polycarbonate material for the output window.

- The exit window material should have a spectral transmission of at least 85% from 640 nm to 690 nm and should block shorter wavelengths.
- Red cell-cast acrylic is recommended.
- The exit window should exhibit a wavefront distortion (transmission) of no more than 0.2 wavelengths peak-to-valley maximum over any 0.08" diameter within the clear aperture.
- The clear aperture of the output window should extend beyond the 54° beam sweep (see *Exit Beam Specifications* on page 9).
- It should have a 60-40 surface quality and be optically flat, clear, and free of scratches, pits, or seeds. If possible, recess the window into the housing for protection or apply a scratch resistance coating (see *Output Window Coatings* on page 13).
- Apply an anti-reflective coating to the window surfaces to reduce the possibility of reflective light interfering with the engine's performance due to the window angle (see *Output Window Coatings* on page 13).

Output Window Coatings

- Anti-Reflection
  An anti-reflective coating can be applied to the inside and/or outside of the window to reduce the possibility of internal beam reflections interfering with the scan performance of the engine. If an anti-reflective coating is applied, it is recommended that it be on both sides of the window providing a 0.5% maximum reflectivity on each side from 640 to 690 nanometers at the nominal window tilt angle. The coating must also meet the hardness adherence requirements of MIL-M-13508.

- Polysiloxane Coating
  Apply a polysiloxane coating to the window surface to help protect the window from surface scratches and abrasions that may interfere with the scan performance of the engine. Recessing the window into the housing can also provided added protection against surface damage such as scratches and chips. If an anti-reflective coating is used, there is no need to apply a polysiloxane coating.

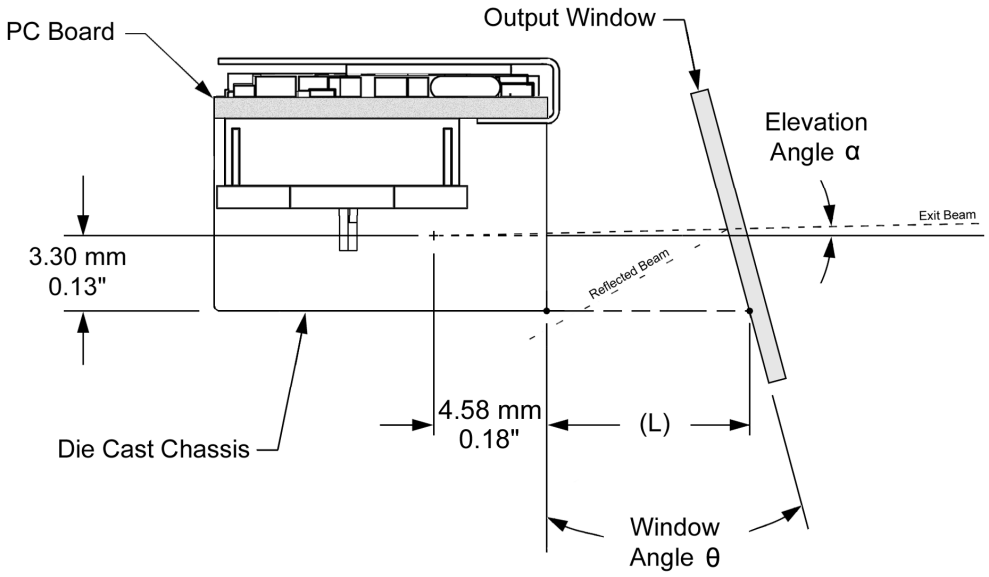
Output Window Angle

Note: An improperly placed window has the serious potential to reduce the scan engine's performance. Careful consideration must be made when designing the output window's distance and angle placement relative to the scan engine's exit beam and chassis.

It is important that angle of the window not be perpendicular to the exit beam of the scan engine. The angle of the window can cause the beam's laser light to reflect off the inside of the window back into the scan engine's optics ultimately degrading the engine's performance.

Refer to the *Figure 12* on page 14 and *Figure 13* on page 15 for specifications on the minimum allowable window angle required to avoid reflective beam interference.

Minimum Allowable Window Position Required
To Avoid Detrimental Internal Reflective Beam Interference at
Positive Exit Beam Angle Tolerance

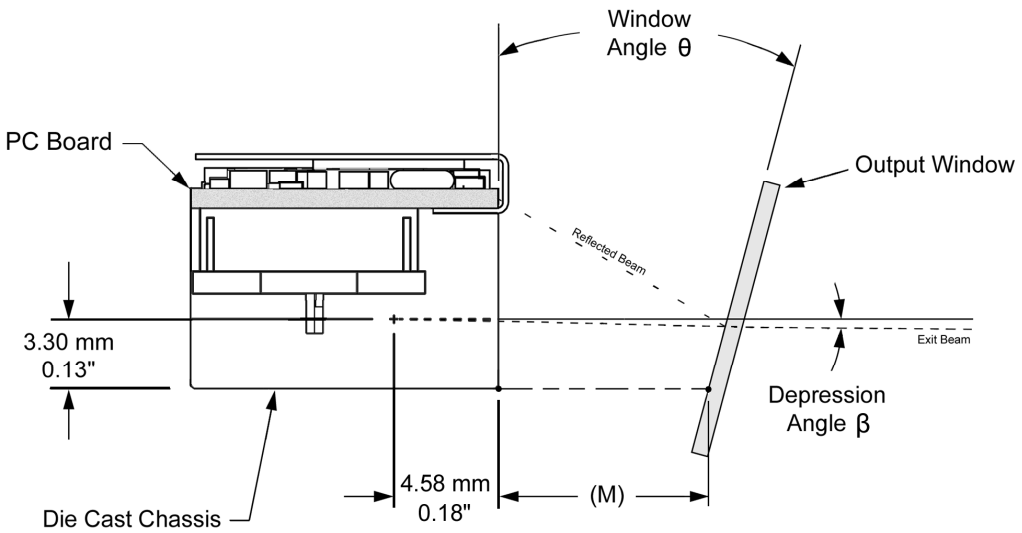


Exit Beam Elevation Angle α	Minimum Projected Distance (mm) from the Engine's Base to the Window's Internal Surface (L)	Minimum Window Angle θ
+2.5°	5.0	28.0°
+2.5°	10.0	14.5°
+2.5°	15.0	10.5°
+2.5°	20.0	8.0°
+2.5°	25.0	7.0°
+2.5°	30.0	6.5°
+2.5°	35.0	6.0°
+2.5°	40.0	5.5°
+2.5°	45.0	5.0°
+2.5°	50.0	5.0°

Figure 12.

Specifications are subject to change without notice.

Minimum Allowable Window Position Required To Avoid Detrimental Internal Reflective Beam Interference at Negative Exit Beam Angle Tolerance



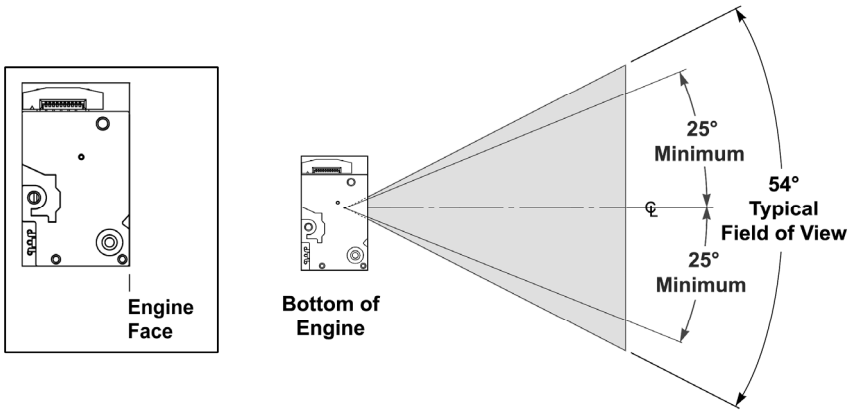
Exit Beam Depression Angle β	Minimum Projected Distance (mm) from the Engine's Base to the Window's Internal Surface (M)	Minimum Window Angle θ
-2.5°	5.0	23.5°
-2.5°	10.0	16.5°
-2.5°	15.0	12.5°
-2.5°	20.0	10.5°
-2.5°	25.0	9.0°
-2.5°	30.0	8.0°
-2.5°	35.0	7.5°
-2.5°	40.0	7.0°
-2.5°	45.0	6.5°
-2.5°	50.0	6.0°

Figure 13.

Specifications are subject to change without notice.

Scan Engine Field of View and Depth of Field

Field of View◈



Distance from Engine Face◈◈	Width of Field of View
50 mm (2")	57 mm (2.2")
254 mm (10")	264 mm (10.4")

◈ *See page 9 for detailed information on the engine's exit beam specifications.*
◈◈ *Based on a .33 mm (13.0 mil) bar code.*

Figure 14. Typical Field of View

Depth of Field vs. Minimum Bar Code Element

Bar Code Element Width			Depth of Field* (In the Field of View)		
			Start (From Engine Face)	End (From Engine Face)	Total
1D	.13 mm	5.2 mil	70 mm (2.75")	95 mm (3.75")	25 mm (1.00")
	.19 mm	7.5 mil	57 mm (2.25")	171 mm (6.75")	114 mm (4.50")
	.26 mm	10.4 mil	50 mm (2.00")	210 mm (8.25")	160 mm (6.25")
	.33 mm	13.0 mil	50 mm (2.00")	254 mm (10.00")	204 mm (8.00")
	.49 mm	19.5 mil	75 mm (2.95")	300 mm (11.81")	225 mm (8.86")

* *For non-decode IS4813 and IS4815 engines, depth of field data is for reference only. Actual values may vary depending on environmental conditions, host hardware, and decoding software.*

Depth of field data was measured at 25°C under typical indoor lighting. Performance may vary depending on testing conditions.

Specifications are subject to change without notice.

Descriptions of IS4823 and IS4825 Operating Modes

Activation Modes

The following activation modes initiate the engine's laser and motor drive circuitry for bar code scanning.

Activate Scanning with the External Trigger (Default).

An external I/O pin is used to enable the scanning cycle. A High-to-Low transition on the I/O signal is used to activate scanning. The signal must be deactivated (HIGH) and re-activated for subsequent scanning cycles. The scanning cycle is terminated based on the default period of time (2 seconds), a variable period of time, when the I/O signal is deactivated (Low-to-High), or when a bar code is scanned and transmitted.

Activate Scanning on Receipt of the <DC2> Character

A received <DC2> character initiates the scanning cycle. The scanning cycle is terminated based on the default period of time (2 seconds), variable laser timeout selected, or when a bar code is scanned and transmitted.

Activate/Deactivate Scanning Using D/E

A received 'E' character initiates the scanning cycle. The scanning cycle is terminated based on the default period of time (2 seconds), variable laser timeout selected, or receipt of a 'D' or when a bar code is scanned and transmitted.

Activate Scanning with Address

A configurable address character is used to initiate scanning. The scanning cycle is terminated based on the default period of time (2 seconds), variable laser timeout selected, or when a bar code is scanned and transmitted.

Common Activation Mode Features

The following configurable activation mode features are available for the IS4823 and IS4825.

Variable Laser-On Timeout (1-second Increments)

A configurable time increment selected as the scanning laser–on time.

Allow Full Laser-On Cycle

The laser stays on for a full cycle even when a bar code is scanned and transmitted.

Blinky Mode

The scanner will blink for 60 cycles (approximately 30 seconds) once the scanning cycle is activated.

Transmit “NO READ” Message on Laser Timeout

If the scanning cycle terminates without scanning a bar code during the cycle, a “NO READ” message is transmitted with the termination of the scanning cycle.

Activate the LED During the “NO READ” Transmission

The LED is activated with the “NO READ” message. The LED is also activated after a successful scan.

Enable RTS “NO READ” Pulse

A configurable RTS pulse width transmitted after the “NO READ” message has been transmitted.

Detect and Notify Mode

The external I/O pin used in the default activation mode is monitored during the inactive laser cycles. An <SI> is transmitted when the I/O is active and an <SO> when it is inactive. Once the scanning activation cycle is started, the external I/O monitoring status is maintained until the scanning cycle is terminated regardless of the actual I/O level.

Continuous Blinky Mode

The scanner will continuously blink on and off, turning the scanning cycle on and off for all normal scanner operations. If a bar code is scanned and transmitted, the same symbol timeout is maintained throughout the cycle preventing additional scans of the same bar code when the scanner is in default mode.

Sleep Mode

Sleep Mode is a power saving mode that can be configured to occur in 10-second increments.

Serial Configuration Mode

The IS4823/IS4825 can be configured by scanning configuration bar codes† or by serial commands sent from the host device. With serial configuration, each command sent to the engine is the ASCII representation of each numeral in the configuration bar code *(see Figure 15)*. The entire numeric string is framed with an ASCII [stx] and an ASCII [etx].

Figure 15.

Example 1:

Feature	Host Command	String Sent to the Engine - ASCII Representation (Hexadecimal Values)
Disable Codabar	[stx]100104[etx]	02h 31h 30h 30h 31h 30h 34h 03h

[ack]

If the command sent to the engine is valid, the engine will respond with an [ack].

[nak]

If the command sent to the engine is invalid, the engine will respond with a [nak] then automatically exit serial configuration mode. All the settings chosen in the failed serial configuration session will be lost. There is a 20-second window between commands. If a 60-second timeout occurs, the engine will send a [nak].

Enter Serial Configuration Mode

To enter serial configuration mode, send the following command, [stx]999999[etx]. The engine will not scan bar codes while in serial configuration mode.

Note: Serial configuration mode uses the current Baud Rate, Parity, Stop Bits and Data Bits settings that are configured in the engine. The default settings of the engine are 9600 bits-per-second, space parity, 2 stop bits, 7 data bits, and no flow control. If a command is sent to the engine to change any of these settings, the change will not take effect until after serial configuration mode is exited.

Exit Serial Configuration Mode

To exit serial configuration mode, send the following command, [stx]999999[etx]. The engine will respond with an [ack].

† *Configuration bar codes are located in the MetroSelect Single-Line Guide, PN 00-02544 and the Supplemental MetroSelect Configuration Guide, PN 00-05268.*

Example 2:

The following sample illustrates the serial command sequence for configuring the engine for the factory default settings, disabling Code 128 scanning, and adding a “G” as a configurable prefix.

Commands for features that require sequences of multiple bar codes for activation (i.e. prefixes, suffixes, and timeout features) should be sent in the same order that they are normally scanned.

Feature	Host Command	ASCII Representation	Engine Response
Enter Configuration Mode	[stx]999999[etx]	02h 39h 39h 39h 39h 39h 39h 03h	[ack] or 06h
Load Defaults	[stx]999998[etx]	02h 39h 39h 39h 39h 39h 38h 03h	[ack] or 06h
Disable Code 128	[stx]100103[etx]	02h 31h 30h 30h 31h 30h 33h 03h	[ack] or 06h
Configure Prefix #1	[stx]903500[etx]	02h 39h 30h 33h 35h 30h 30h 03h	[ack] or 06h
Code Byte 0	[stx]0[etx]	02h 30h 03h	[ack] or 06h
Code Byte 7	[stx]7[etx]	02h 37h 03h	[ack] or 06h
Code Byte 1	[stx]1[etx]	02h 31h 03h	[ack] or 06h
Exit Configuration Mode	[stx]999999[etx]	02h 39h 39h 39h 39h 39h 39h 03h	[ack] or 06h

Abbreviated ASCII Table

Character	Hex Value	Decimal Value
[STX]	02h	2
[ETX]	03h	3
[ACK]	06h	6
[NAK]	15h	21
0	30h	48
1	31h	49
2	32h	50
3	33h	51
4	34h	52
5	35h	53
6	36h	54
7	37h	55
8	38h	56
9	39h	57

General Design Specifications

Operational

Light Source:	Visible Laser Diode (VLD) @ 650 nm	
Laser Power:	1 mW	
Depth of Scan Field:	50 mm – 254 mm (2" – 10") for 0.33 mm (13 mil) bar codes	
Width of Scan Field:	57 mm (2.2") @ 50 mm (2") from engine face	
	264 mm (10.4") @ 254 mm (10") from engine face	
Scan Speed:	100 Scan Lines per Second Typical	
Scan Pattern:	Single Scan Line	
Minimum Bar Width:	0.10 mm (4.0 mil)	
Symbologies Supported:	IS4813 and IS4815	Software Dependent
	IS4823 and IS4825	Autodiscriminates All Standard 1D Symbologies
System Interface:	IS4823 and IS4825	USB, TTL RS232
Print Contrast:	35% Minimum Reflectance Difference	
Number of Characters Read:	IS4813 and IS4815	Decode Dependent
	IS4823 and IS4825	Up to 80 data characters (Maximum)
Roll, Pitch, Yaw	42°, 68°, 52°	

Mechanical

Dimensions:	See pages 6 – 8 for detailed specifications.	
Weight (Maximum):	IS4813 / IS4815 Non-Decode Engine	8 g (0.282 oz)
	IS4823 / IS4825 Bracketed (-1) Assembly	15 g (0.529 oz)
	IS4823 / IS4825 Non-Bracketed (-1) Assembly	10 g (0.353 oz)
Termination:	IS4813 / IS4815 Non-Decode Engine	10-PIN ZIF Connector
	IS4823 / IS4825 Decode PCB	12-PIN ZIF Connector
Enclosure and Mounting:	See pages 6 – 13 for detailed specifications on enclosure and mounting guidelines.	

Specifications are subject to change without notice.

Electrical

	IS4813	IS4815
Input Voltage:	3.3VDC ± 0.3VDC	5.0VDC ± 5%
Power Consumption:	400 mW	350 mW
Typical Operating Current:	< 120 mA @ 3.3VDC	< 70 mA @ 5.0VDC
Standby Current:	< 30 mA @ 3.3VDC	< 15 mA @ 5.0VDC

	IS4823		IS4825	
	USB	TTL	USB	TTL, RS232
Peak Operating Current:	170 mA	150 mA	135 mA	135 mA
Idle Current:	75 mA	50 mA	72 mA	45 mA
Sleep Current:	65 mA	5.5 mA	53 mA	15 mA
Suspend Current (USB):	5.5 mA	N/A	0.30 mA	N/A
Power Down Current (TTL):		5.5 mA		15 mA

See pages 33 - 36 for regulatory compliance information.

Environmental

Operating Temperature:	-0°C to 40°C (32°F to 104°F)
Storage Temperature:	-40°C to 70°C (-40°F to 158°F)
Humidity:	5% to 95% relative humidity, non-condensing
Vibration Protection:	7G over 10 – 500 Hz

Specifications are subject to change without notice.

Detailed Electrical Specifications

Absolute Maximum Ratings

Signal	Signal Description	Minimum	Maximum
Vinput †	Voltage Applied to Any input pin (except D+ and D-) *	-0.3V	Vin
Voutput	Voltage Applied to Any output pin **	-0.3V	Vin + 0.3V

* *For USB version, Voltages on D+ and D- signal must conform to USB Specification*

** *Voutput must be less than 5.5V for all pins*

† *If the Vinput signal is greater than VIN, current will flow from the input to the VIN pin through the pull up resistors on the engine. In Suspend Mode, this may cause current to flow into the USB power. This is not recommended.*

IS4823 DC Operating Voltages

Signal	Signal Description	Minimum	Maximum	Condition
VIN	Operating Voltage	3.0V	3.6V	
VIH(1)	Input High (RX, CTS)	2.5V		
VIL(1)	Input Low (RX, CTS)		0.8V	
VIH(2)	Input High (TTL_INV, nWake)	0.8 x Vin		
VIL(2)	Input Low (TTL_INV, nWake)		0.8V	
VIH(3)	Input High (EXT. Trigger)	0.8 x Vin		
VIL(3)	Input Low (EXT. Trigger)		0.8V	
VOH(1)	Output High Voltage (TX,RTS)	0.8 x Vin		Isource = 16 mA
VOL(1)	Output Low Voltage (TX,RTS)		0.14 x Vin	Isink = 16 mA
VOH(2)	Output High Voltage (nBeeper, nGoodRead)	***	3.6V	
VOL(2)	Output Low Voltage (nBeeper, nGoodRead)		1.6V	Isink = 25 mA
VOH(3)	Output High Voltage (Power down)	***	3.6V	
VOL(3)	Output Low Voltage (Power down)		0.2V	Isink = 8 mA

*** *PWRDWN, nGoodRead, and nBeeper are open drain outputs w/ 100K pull-ups to VIN. Actual VOH will be determined by the parallel resistance of the 100K pull up and any external impedance.*

IS4825 DC Operating Voltages

Signal	Signal Description	Minimum	Maximum	Condition
VIN	Operating Voltage	4.75V	5.25V	
VIH(1)	Input High (RX, CTS)	2.5V		
VIL(1)	Input Low (RX, CTS)		0.8V	
VIH(2)	Input High (TTL_INV, nWake)	0.8 x Vin		
VIL(2)	Input Low (TTL_INV, nWake)		0.8V	
VIH(3)	Input High (EXT. Trigger)	0.8 x Vin		
VIL(3)	Input Low (EXT. Trigger)		0.8V	
VOH(1)	Output High Voltage (TX,RTS)	0.8 x Vin		Isource = 16 mA
VOL(1)	Output Low Voltage (TX,RTS)		0.14 x Vin	Isink = 16 mA
VOH(2)	Output High Voltage (nBeeper, nGoodRead)	***	3.6V or 5.5V	
VOL(2)	Output Low Voltage (nBeeper, nGoodRead)		1.6V	Isink = 25 mA
VOH(3)	Output High Voltage (Power down)	***	3.6V or 5.5V	
VOL(3)	Output Low Voltage (Power down)		0.2V	Isink = 8 mA

*** *PWRDWN, nGoodRead, and nBeeper are open drain outputs w/ 100K pull-ups to VIN. Actual VOH will be determined by the parallel resistance of the 100K pull up and any external impedance.*

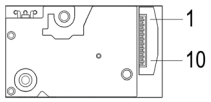
Current Draw @ 25°C

Signal	Signal Description	USB		TTL	
		VIN = 3.3V	VIN = 5V	VIN = 3.3V	VIN = 5V
Continuous Scan mode	Average current draw during continuous scan mode*	150 mA	130 mA	130 mA	130 mA
Stand By	Average current draw while in idle mode	60 mA	72 mA	50 mA	45 mA
Sleep	Average current draw while in sleep mode	50 mA	53 mA	5.5 mA	15 mA
Suspend Mode (USB)	Average current draw in USB suspend (USB version only)	5.5 mA	0.3 mA	N/A	N/A

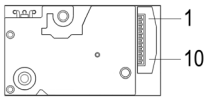
* *Continuous Scan Mode current will vary based on object size, distance, and type. The numbers listed above are typical.*

Scan Engine Terminations

IS4813 Engine Connections

10-Pin ZIF Connector			
 *Figure 16. IS4813*	Pin	Signal Name	Function
	1	No Connect	No Connect
	2	Power, V_{CC}	3.3V ± 0.3V
	3	No Connect	No Connect
	4	Laser Enable*	High = Laser OFF
			Low = Laser ON, only if pin 5 (scan enable) is also Low
	5	Scan Enable*	High = Engine OFF
			Low = Engine ON
	6	Digitized Bar Pattern, Data Out	High = Bar
			Low = Space
	7	Start of Scan, Scan Sense	Level changes from high to low, or low to high, when the laser changes direction at the start of the scan line.
	8 and 9	Ground	Power Ground
	10	No Connect	No Connect

IS4815 Engine Connections

10-Pin ZIF Connector			
 *Figure 17. IS4815*	Pin	Signal Name	Function
	1	No Connect	No Connect
	2	Power, V_{CC}	5.0V ± 5%
	3	No Connect	No Connect
	4	Laser Enable*	High = Laser OFF
			Low = Laser ON, only if pin 5 (scan enable) is also Low
	5	Scan Enable*	High = Engine OFF
			Low = Engine ON
	6	Digitized Bar Pattern, Data Out	High = Bar
			Low = Space
	7	Start of Scan, Scan Sense	Level changes from high to low, or low to high, when the laser changes direction at the start of the scan line.
	8 and 9	Ground	Power Ground
	10	No Connect	No Connect

* *See Timing Diagrams on page 30.*

Decode Printed Circuit Board Terminations

USB Decode PCB, 3.3V

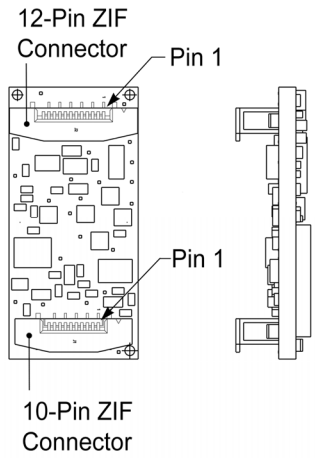


Figure 18.

12-Pin ZIF Connector		
Pin	Signal Name	Function
1	No Connect	No Connection
2	+3.3V	Power: Supply Voltage Input, +3.3V ± 0.3V
3	GND	Ground: Power and Signal Ground
4	D-	Input: USB D- Signal
5	<reserved>	Pin Function Reserved
6	D+	Input: USB D+ Signal
7	<reserved>	Pin Function Reserved
8	PWRDWN	Output: Active High = IS4823 is in Power Down Mode
9	nBEEPER	Output: Active Low, Signal Capable of Sinking Current See *Detailed Electrical Specifications* starting on page 23.
10	nGood Scan	Output: Active Low, Signal for Sinking Current (Good Scan) See *Detailed Electrical Specifications* starting on page 23.
11	nEXT Wake	Input: Active Low, Wakes Engine From Suspend or Sleep Mode
12	EXT Trig	Input: Active Low, Signal Used as Trigger Input to Activate the Engine
10-Pin ZIF Connector		
Pin	Signal Name	Function
1	SDA	I^2C Data (Bi-Directional) – Devices Function as Auxiliary Devices
2	GND	Ground: Power and Signal Ground
3	GND	Ground: Power and Signal Ground
4	Scan Sense	Level changes from High to low or low to high when the laser changes direction at the start of the scan line
5	Data	High = Bar
		Low = Space
6	Scan Enable	High = Engine OFF
		Low = Engine ON
7	Laser Enable	High = Laser OFF
		Low = Laser ON
8	NC	No Connection
9	+3.3V	Power: Supply Voltage Input, +3.3V ± 0.3V
10	SCL	I^2C Data (Bi-Directional) – Devices Function as Auxiliary Devices

USB Decode PCB, 5V

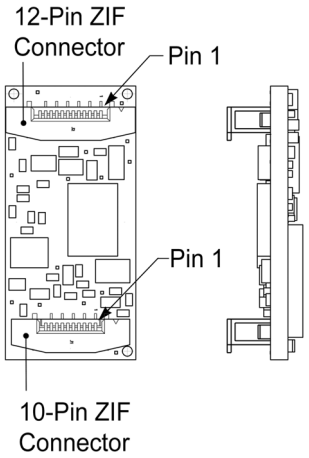


Figure 19.

12-Pin ZIF Connector		
Pin	Signal Name	Function
1	No Connect	No Connection
2	+5.0V	Power: Supply Voltage Input, +5.0V ± 5%
3	GND	Ground: Power and Signal Ground
4	D-	Input: USB D- Signal
5	<reserved>	Pin Function Reserved
6	D+	Input: USB D+ Signal
7	<reserved>	Pin Function Reserved
8	PWRDWN	Output: Active High = Engine is in Power Down Mode
9	nBEEPER	Output: Active Low, Signal Capable of Sinking Current See *Detailed Electrical Specifications* starting on page 23.
10	nGood Scan	Output: Active Low, Signal for Sinking Current (Good Scan) See *Detailed Electrical Specifications* starting on page 23.
11	nEXT Wake	Input: Active Low, Wakes Engine from Power Down or Sleep Mode
12	EXT Trig	Input: Active Low, Signal Used as Trigger Input to Activate the Engine
10-Pin ZIF Connector		
Pin	Signal Name	Function
1	SDA	I^2C Data (Bi-Directional) – Devices Function as Auxiliary Devices
2	GND	Ground: Power and Signal Ground
3	GND	Ground: Power and Signal Ground
4	Scan Sense	Level changes from High to low or low to high when the laser changes direction at the start of the scan line
5	Data	High = Bar
		Low = Space
6	Scan Enable	High = Engine OFF
		Low = Engine ON
7	Laser Enable	High = Laser OFF
		Low = Laser ON
8	NC	No Connection
9	+5.0V	Power: Supply Voltage Input, +5.0V ± 5%
10	SCL	I^2C Data (Bi-Directional) – Devices Function as Auxiliary Devices

TTL, RS232, 3.3V / 5V

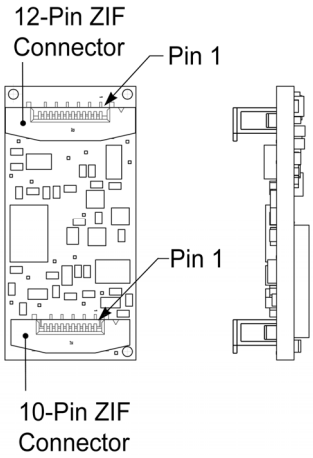


Figure 20.

12-Pin ZIF Connector		
Pin	Signal Name	Function
1	TTLINV	Input: TTL RS232 Polarity Control with 33.2k ohm Pull-Up
2	+3.3V or 5.0V	Power: Supply Voltage Input, +3.3V ± 0.3V or +5.0V ± 5%
3	GND	Ground: Power and Signal Ground
4	RxD	Input: TTL Level RS232 Receive Data
5	TxD	Output: TTL Level RS232 Transmit Data
6	CTS	Input: TTL Level Clear to Send
7	RTS	Output: TTL Level RS232 Request to Send
8	PWRDWN	Output: Active High = IS4823 is in Power Down Mode
9	nBEEPER	Output: Active Low, Signal Capable of Sinking Current See *Detailed Electrical Specifications* starting on page 23.
10	nGood Scan	Output: Active Low, Signal for Sinking Current (Good Scan) See *Detailed Electrical Specifications* starting on page 23.
11	nEXT WAKE	Input: Active Low, Signal Used to Bring Engine Out of Power Down
12	EXT Trig	Input: Active Low, Signal Used as Trigger Input to Activate the Engine
10-Pin ZIF Connector		
Pin	Signal Name	Function
1	SDA	I^2C Data (Bi-Directional) – Devices Function as Auxiliary Devices
2	GND	Ground: Power and Signal Ground
3	GND	Ground: Power and Signal Ground
4	Scan Sense	Level changes from High to low or low to high when the laser changes direction at the start of the scan line
5	Data	High = Bar
		Low = Space
6	Scan Enable	High = Engine OFF
		Low = Engine ON
7	Laser Enable	High = Laser OFF
		Low = Laser ON
8	NC	No Connection
9	+3.3V or 5.0V	Power: Supply Voltage Input, +3.3V ± 0.3V or +5.0V ± 5%
10	SCL	I^2C Data (Bi-Directional) – Devices Function as Auxiliary Devices

Flex Cable Specifications and Installation Guidelines

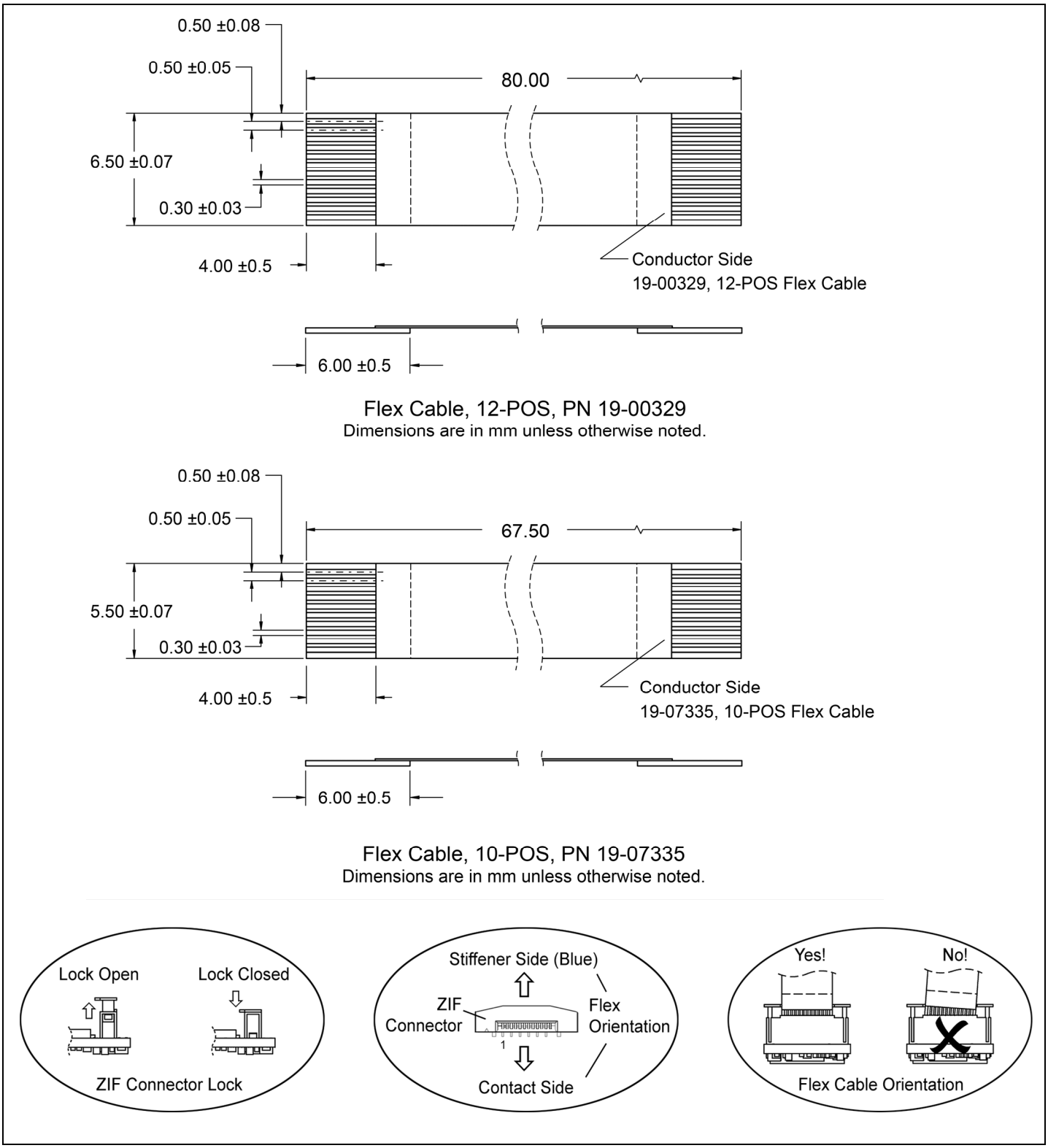


Figure 21. Flex Cable Specifications and Installation Guidelines

Specifications are subject to change without notice.

Timing Diagrams

Startup Condition Timing Diagram

The timing diagram below illustrates the correct power up procedure for the IS4813 and IS4815 engines.

Scan Enable and Laser Enable are host driven signals. The Scan Enable and Laser Enable signals should be kept LOW (ON) at power up. Scan Control and Laser Control are engine driven signals.

The engine's onboard microcontroller drives the Scan Control and Laser Control signals so the engine's laser will not turn ON before the scan mirror starts moving. This allows the onboard microcontroller to sense immediately any malfunction with the engine's scan mirror, turning OFF the laser automatically regardless of the state of Laser Enable signal being received from the Host.

To ensure scan data integrity the Scan Sense pulses are delayed for approximately 55 ms after the Laser Enable signal goes LOW (ON). To save power, turn OFF power to the engine after the scan is complete or when the engine is not scanning. To turn the engine's power OFF, the Laser Enable signal from the host should be held HIGH (OFF) before turning OFF power to the engine.

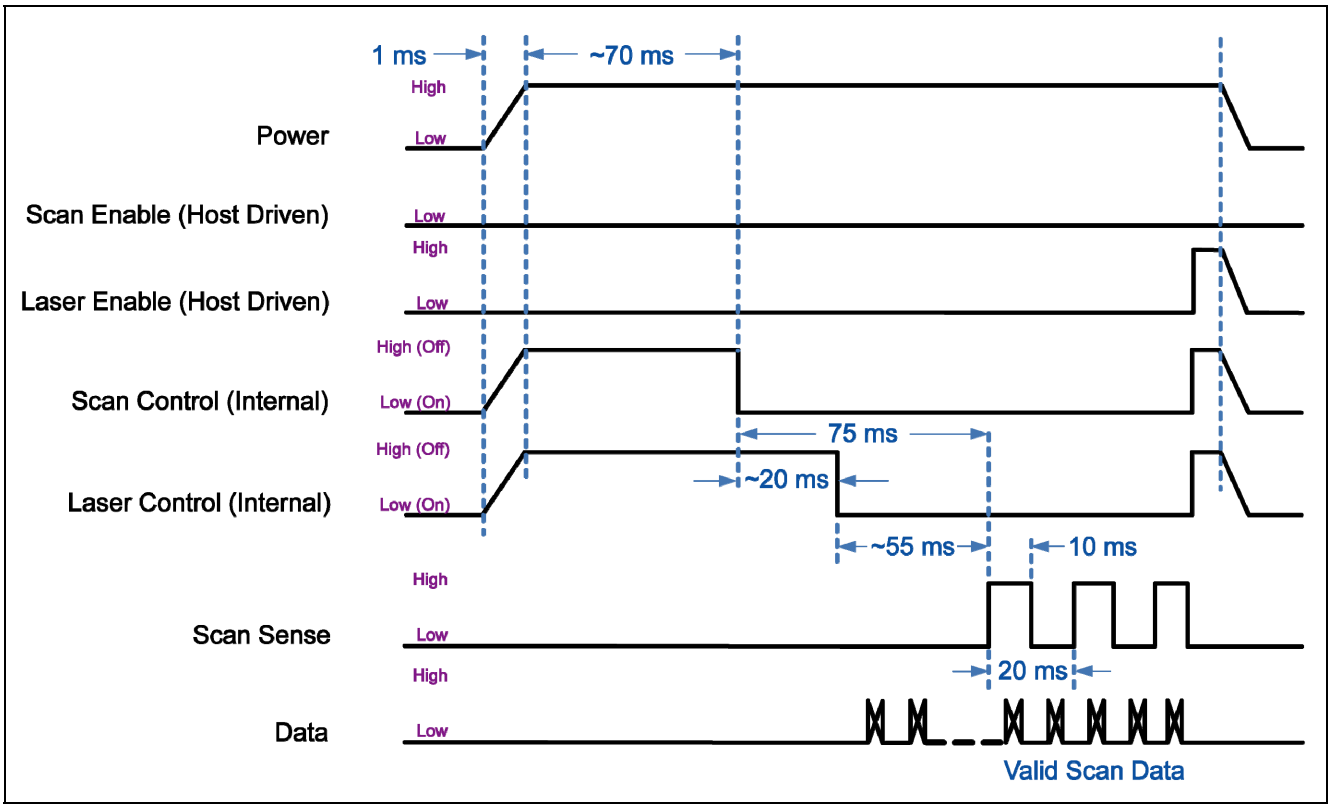


Figure 22. IS4813/IS4815 Timing Diagram, Startup Condition

Scan Sense Timing Diagram

The Scan Sense signal is a 50% duty cycle square wave with the transitions from HIGH to LOW indicating a change in the scan direction of the scanning beam (see Figure 22). Valid scan data occurs between the HIGH to LOW transitions. Figure 23 illustrates the condition in which power to the engine stays ON. Scan Enable and Laser Enable signals are controlled separately by the host.

The onboard microcontroller is programmed to ensure the engine's scan mirror is moving before the laser is turned ON. This allows the host to turn ON Scan Enable and Laser Enable signals simultaneously without worrying about laser safety. The Laser Enable signal can even be set LOW (ON) before the Scan Enable signal goes LOW (ON). If the scan mirror is moving and Laser Enable signal goes LOW (ON), the onboard microcontroller immediately turns ON the laser. If Laser Enable signal is LOW (ON) and Scan Enable signal is HIGH (OFF) then the onboard microcontroller waits for the Scan Enable signal to go LOW (ON) and ensures the scan mirror has started moving before turning the laser ON.

The Scan Sense line remains HIGH until the Scan Enable signal goes LOW (ON). After approximately 55 ms, it toggles with a 50% duty cycle representing the scan sweep direction. Valid scan data appears within these pulses.

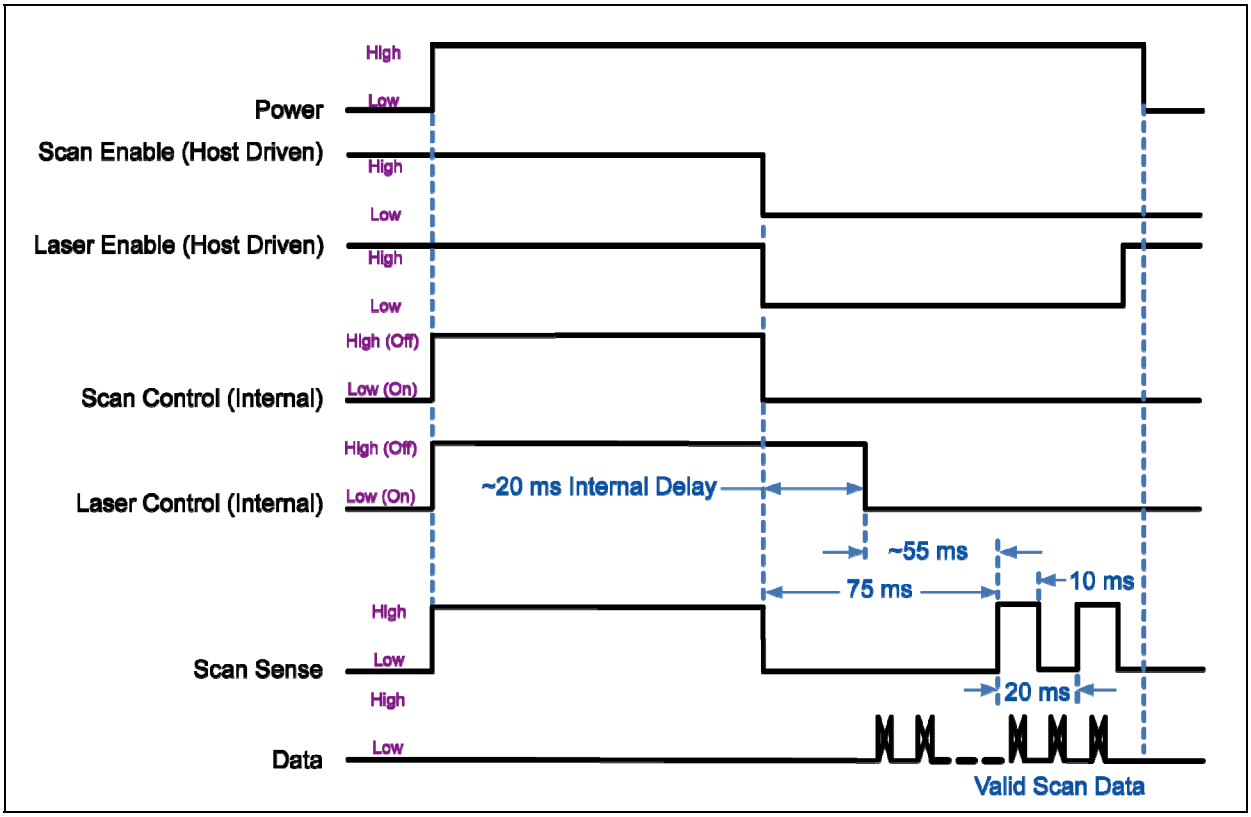


Figure 23. Timing Diagram Scan Enable and Laser Enable Controlled Separately

Bar Code Element Time Calculation

Realization of the full depth of field for all bar codes given in the specification is based on the ability of the decoding hardware to resolve a varying range of minimum element times. The minimum element time calculation for a given bar code size at a given distance is shown in Equation 1 (*below*).

Minimum Element Time = (Element Size / Spot Speed)

Equation 1.

Example:

Bar code Size = 5.2 mil
Spot Speed @ 95 mm from face = 650 inches/second

Minimum Element Time = (0.0052 inches/ (650 inches/second)) = 8.0 µsec

Regulatory Compliance

THIS DEVICE DOES NOT COMPLY WITH 21 CFR 1040. USE ONLY AS COMPONENT.

The IS4800 Series Laser Scan engines are designed to meet the requirements of IEC Class 2 in accordance with IEC 60825-1:1993+A1:1997+A2:2001. IEC Class 2 is defined as follows:

Emission Duration: Greater than 0.25 seconds
Accessible Emission Limit: Less than 0.001 W (1.0 milliwatt) average radiant power

The IS4800 laser scan engine series is registered with the Center for Devices and Radiological Health as a laser “component”. The addition of shutdown controls, labeling and informational requirements are necessary to achieve compliance with the performance standard published in the Code of Federal Regulations (CFR), Title 21 Parts 1040.10 and 1040.11. **It is the responsibility of the manufacturer who incorporates the scan engine into their product to provide the additional performance, labeling, and informational requirements necessary to comply with all federal laser safety regulations.**

The specifications required for agency approval are not obtainable until the IS4800 engine is used in its final configuration. Metrologic is unable to fulfill these requirements because the scan engine will operate differently depending upon where it is used as a component. The following information concerning the scan engine appears on the shipping label:

THIS DEVICE DOES NOT COMPLY WITH 21 CFR 1040.
USE ONLY AS A COMPONENT.

Manufacturers incorporating unmodified IS4800 engines into their product may reference the following accession number on items in their Laser Product Report that request information concerning features inherent in the IS4800 engine design.

Accession Number: 0620138-00

It is the responsibility of the manufacturer who incorporates the scan engine into their product to obtain country specific regulatory compliance prior to the sale of the product. Refer to one of the following sections for further explanation.

United States: Refer to page 34 for more information.

Canada: Refer to page 35 for more information.

Europe: Refer to page 35 for more information.

United States

Laser Safety

To assist with the FDA filing requirements (refer to Regulatory Requirements), Metrologic has registered the scan engine with the FDA as a component. Customers can contact CDRH at the following address:

Food and Drug Administration
Center for Devices and Radiological Health
Light Products Branch (HFX-312)
Office of Compliance
2098 Gaither Road
Rockville, MD 20850
Tel: 301-594-4654
www.fda.gov/cdrh

Requirements for laser products are described in CFR (Code of Federal Regulation) Title 21, part 1040.10 & 1040.11 from the Government Printing Office. Copies can be ordered by calling 202-512-1800, ordering on line from www.access.gpo.gov or writing to:

Superintendent of Documents
PO Box 371954
Pittsburgh, PA 15250-7954

Note: State and local governments may regulate the use products containing lasers. The manufacturer should consult the applicable government regulations for more information.

Copies of Product Reporting Guides, other guides, and related documents are available as PDF documents from the CDRH website at: www.fda.gov/cdrh/comp/eprc.html. Additional resources include the Division of Small Manufacturers, International and Consumer Assistance (DSMICA) in Rockville, Maryland at 1-800-638-2041.

EMC

Certain combinations of scan engines and associated electronics may require testing to insure compliance with the following Federal Communications Commission regulation: 47 CFR Part 15

Note: When using the scan engine with RF equipment, modems, etc. may require examination(s) to the standard(s) for the specific equipment combination. It is the manufacturers' responsibility to comply with the applicable federal regulation(s).

The IS4800 series laser scan engine is designed to meet EN55022 Radiated Class B emission limits. The engine was installed in a representative system and tested for compliance.

Canada

Laser Safety

The Radiation Protection Bureau currently accepts products meeting the FDA standards in Canada. For more information contact:

Radiation Protection Bureau
775 Brookfield Road
Ottawa, Ontario K1A 1C1

EMC

Products meeting FCC 47 CFR Part 15 will meet Industry Canada interference-causing equipment standard for digital apparatus, ICES-003. Additional testing is not required.

A written notice indicating compliance must accompany the apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. The notice may be in the form of a statement included in the user's manual if, because of insufficient space or other restrictions, it is not feasible to affix a label to the apparatus.

Europe

The CE Mark is required on products, which incorporate the IS4813, and the IS4815 scan engines if the products are to be imported into European Economic Area (EEA) countries. Use of the CE Mark requires compliance with directives and standards dependent upon the type of product. Information may be found at http://europa.eu.int/comm/enterprise/newapproach/.

Laser Safety

IEC 60825-1:1993+A1:1997+A2:2001,
EN 60825-1:1994+A2:2001+A1:2002
"Safety of Laser products"

Compliance with either of the standards listed above is required for the product to bear the CE mark.

Note: Non EEA countries may impose additional testing/certification requirements.

EMC

Certain combinations of IS4800 scan engines and associated electronics may require certification of compliance with the European EMC Directive. EMC compliance of finished products in Europe can be accomplished by the following method:

- The manufacturer may certify to the EC's Electromagnetic Compatibility Directive 89/336/EEC. Compliance is required for the product to bear the CE Mark.

Note: Non EEA countries may impose additional testing/certification requirements.

The IS4800 series laser scan engine is designed to meet EN55022 Radiated Class B emission limits. The engine was installed in a representative system and tested for compliance.

Electrical Safety

The scan engines are built to conform to the European Low Voltage Directive 73/23/ EEC.

⚠ *Caution*

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure. Under no circumstances should the customer attempt to service the laser scanner. Never attempt to look at the laser beam, even if the scanner appears to be nonfunctional. Never open the scanner in an attempt to look into the device. Doing so could result in hazardous laser light exposure. The use of optical instruments with the laser equipment will increase eye hazard.

⚠ *Atención*

La modificación de los procedimientos, o la utilización de controles o ajustes distintos de los especificados aquí, pueden provocar una luz de láser peligrosa. Bajo ninguna circunstancia el usuario deberá realizar el mantenimiento del láser del escáner. Ni intentar mirar al haz del láser incluso cuando este no esté operativo. Tampoco deberá abrir el escáner para examinar el aparato. El hacerlo puede conllevar una exposición peligrosa a la luz de láser. El uso de instrumentos ópticos con el equipo láser puede incrementar el riesgo para la vista.

⚠ *Attention*

L'emploi de commandes, réglages ou procédés autres que ceux décrits ici peut entraîner de graves irradiations. Le client ne doit en aucun cas essayer d'entretenir lui-même le scanner ou le laser. Ne regardez jamais directement le rayon laser, même si vous croyez que le scanner est inactif. N'ouvrez jamais le scanner pour regarder dans l'appareil. Ce faisant, vous vous exposez à une rayonnement laser qú êst hazardous. L'emploi d'appareils optiques avec cet équipement laser augmente le risque d'endommagement de la vision.

⚠ *Achtung*

Die Verwendung anderer als der hier beschriebenen Steuerungen, Einstellungen oder Verfahren kann eine gefährliche Laserstrahlung hervorrufen. Der Kunde sollte unter keinen Umständen versuchen, den Laser-Scanner selbst zu warten. Sehen Sie niemals in den Laserstrahl, selbst wenn Sie glauben, daß der Scanner nicht aktiv ist. Öffnen Sie niemals den Scanner, um in das Gerät hineinzusehen. Wenn Sie dies tun, können Sie sich einer gefährlichen Laserstrahlung aussetzen. Der Einsatz optischer Geräte mit dieser Laserausrüstung erhöht das Risiko einer Sehschädigung.

⚠ *Attenzione*

L’utilizzo di sistemi di controllo, di regolazioni o di procedimenti diversi da quelli descritti nel presente Manuale può provocare delle esposizioni a raggi laser rischiose. Il cliente non deve assolutamente tentare di riparare egli stesso lo scanner laser. Non guardate mai il raggio laser, anche se credete che lo scanner non sia attivo. Non aprite mai lo scanner per guardare dentro l’apparecchio. Facendolo potete esporVi ad una esposizione laser rischiosa. L’uso di apparecchi ottici, equipaggiati con raggi laser, aumenta il rischio di danni alla vista.

Limited Warranty

The IS4800 series laser scan engines are manufactured by Metrologic at its Suzhou, China facility. The IS4800 series scan engines have a two (2) year limited warranty from the date of manufacture. Metrologic warrants and represents that all IS4800 series scan engines are free of all defects in material, workmanship and design, and have been produced and labeled in compliance with all applicable US Federal, state and local laws, regulations and ordinances pertaining to their production and labeling.

This warranty is limited to repair, replacement of product or refund of product price at the sole discretion of Metrologic. Faulty equipment must be returned to one of the following Metrologic repair facilities: Blackwood, New Jersey, USA; Madrid, Spain; or Suzhou, China. To do this, contact the appropriate Metrologic Customer Service/Repair Department to obtain a Returned Material Authorization (RMA) number.

In the event that it is determined that the equipment failure is covered under the warranty, Metrologic shall, at its sole option, repair the Product or replace the Product with a functionally equivalent unit and return such repaired or replaced Product without charge for service or return freight, whether distributor, dealer/reseller, or retail consumer, or refund an amount equal to the original purchase price.

This limited warranty does not extend to any Product, which, in the sole judgment of Metrologic, has been subjected to abuse, misuse, neglect, improper installation or handling or is damaged as a result of a failure to follow instructions contained in this manual or other documentation provided with the Product. The warranty is void if the Product is not encased in a properly designed enclosure (sealed to: (a) prevent infiltration by airborne contaminants; (b) protect against ESD, humidity and mechanical shocks; and (c) be non-condensing) or Product is opened by anyone other than Metrologic's repair department or authorized repair centers. For additional information on enclosure design, see pages 10 -15 of the Installation Guide.

THIS LIMITED WARRANTY, EXCEPT AS TO TITLE, IS IN LIEU OF ALL OTHER WARRANTIES OR GUARANTEES, EITHER EXPRESS OR IMPLIED, AND SPECIFICALLY EXCLUDES, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE UNDER THE UNIFORM COMMERCIAL CODE, OR ARISING OUT OF CUSTOM OR CONDUCT. THE RIGHTS AND REMEDIES PROVIDED HEREIN ARE EXCLUSIVE AND IN LIEU OF ANY OTHER RIGHTS OR REMEDIES. IN NO EVENT SHALL METROLOGIC BE LIABLE FOR ANY INDIRECT OR CONSEQUENTIAL DAMAGES, INCIDENTAL DAMAGE, DAMAGES TO PERSON OR PROPERTY, OR EFFECT ON BUSINESS OR PROPERTY, OR OTHER DAMAGES OR EXPENSES DUE DIRECTLY OR INDIRECTLY TO THE PRODUCT, EXCEPT AS STATED IN THIS WARRANTY. IN NO EVENT SHALL ANY LIABILITY OF METROLOGIC EXCEED THE ACTUAL AMOUNT PAID TO METROLOGIC FOR THE PRODUCT. METROLOGIC RESERVES THE RIGHT TO MAKE ANY CHANGES TO THE PRODUCT DESCRIBED HEREIN.

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Patents

Worldwide patents pending.

Index

T

V

W

Z

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